Dry Weather Discharge Treatment Feasibility Study

Submitted by:
County of Los Angeles
Department of Public Works
Watershed Management Division

On behalf of:
County of Los Angeles
Municipal Storm Water Permittees
and
County Sanitation Districts of
Los Angeles County

July 1, 2003

1 Introduction

Urban runoff is a contributor of pollution to the nations waterways. The National Pollution Discharge Elimination System (NPDES) permitting program provides a mechanism for the reduction of pollutants from Municipal Separate Storm Sewer Systems (MS4s) to the maximum extent practicable. One method identified for pollution reduction is the diversion of low-flow urban runoff to sanitary sewer treatment plants prior to reaching the waterways. Several factors such as availability of treatment capacity, available transport capacity, and the assurance that the urban runoff pollutants will not upset the treatment process must all come together before low-flow diversion can be considered feasible.

In this study, the County of Los Angeles Permittees, in cooperation with the County Sanitation Districts of Los Angeles County (LACSD), identified dry weather storm drain discharges and evaluated the feasibility of 1) their diversion to an LACSD or City of Los Angeles sewer system or 2) their treatment using alternative treatment control Best Management Practices (BMPs).

1.1 MS4 Permit Background

This Treatment Feasibility Study was performed in order to fulfill the requirement of the County of Los Angeles Municipal Stormwater Permit (Permit) mandated in Part IV.F.10, Public Agency Activities Program, which states:

> "The Permittees in cooperation with the County Sanitation Districts of Los Angeles County shall conduct a study to investigate the possible diversion of dry weather discharges or the use of alternative Treatment Control BMPs to treat flows from their jurisdiction which may impact public health and safety and/or the environment. The Permittees shall collectively review their individual prioritized lists and create a watershed based priority list of drains for potential diversion or treatment and submit the priority listing to the Regional Board Executive Officer, no later than July 1, 2003."

At the July, 2002, Executive Advisory Committee (EAC) meeting an ad hoc committee with members from LACSD, City of Los Angeles, County of Los Angeles Department of Public Works (County), and the various city representatives began working on this study on behalf of all Permittees. The committee has reported monthly to the EAC on the direction and progress of the study. In addition, Permittees have been updated on the study at the quarterly Watershed Management Committee meetings.

1.2 Expected Outcome

During the September, 2002, EAC meeting, Dennis Dickerson, Executive Officer of the Regional Water Quality Control Board, Los Angeles Region, indicated to the attendees that the priority lists from this study will be used to evaluate projects for future grant funding. Therefore, if a municipality applies for a grant to build a diversion or implement another treatment alternative for a drain on the priority list, they would be more likely to

receive funding than a municipality applying for a drain that is lower on the list or not on the list at all.

2 Methodology

The methodology established for this study was developed in order to clearly identify the process that would be used to classify and prioritize drains for possible diversion or alternative treatment. It was also meant to be used as a guideline for future storm drain prioritization as further flow rate and water quality data become available.

2.1 Water Bodies Included

The ad hoc committee developed criteria to ensure that the water bodies already identified by the Regional Board as impaired for a beneficial use were addressed. Thus, the study included rivers, streams, and channels that were identified on the 1998 California 303(d) List of Impaired Waters. The 2002 California 303(d) List of Impaired Waters received partial EPA approval on June 5, 2003; and, therefore, it was not referenced for this study. Concentrating on water bodies with historical water quality impairments allowed the study to be streamlined while keeping the focus on those waters that would benefit the most from contaminant mitigation measures. Table 1 in Appendix A summarizes the water bodies that were the focus of this study and their corresponding impairments.

2.2 Sources of Information

The information used to classify and prioritize drains for possible diversion or alternative treatment came from two types of sources. First, existing storm drain data that had been collected previously by various agencies was used to help expedite the study and allow it to be completed in a timely manner. Second, field investigations were performed for areas without data from previous dry weather flow and water quality assessments.

2.2.1 Historical/ Existing Data

Due to the time constraints on conducting this study, information and data on dry weather urban runoff previously collected by other agencies/groups were used in part for this study. Through the development of Total Maximum Daily Load (TMDL) deterministic models and other environmental studies, the characteristics of dry-weather urban runoff have been documented by others for many of the water bodies evaluated during this study. These water bodies include the Los Angeles River and tributaries, San Gabriel River and tributaries, Dominguez Channel, north Santa Monica Bay drainage area, and south Santa Monica Bay drainage area. Table 2 in Appendix A shows the organization that was the lead agency in the monitoring efforts and other participants.

2.2.2 Field Investigation

For areas without data from previous dry weather flow assessments, field investigations were performed by the County. Since county-owned drains were present throughout every impaired reach, the County provided the resources for the investigation on behalf of all Permittees. The investigation was divided into two phases. During the first phase, drain locations and flow rates were identified; and during the second phase, water quality samples were collected and analyzed for the impairing constituents. All impairing constituents that could be analyzed by the County of Los Angeles Toxicology Laboratory were included, except the constituents that require a sediment sample for analysis.

2.3 Selection Process

The screening process used during the field investigations to identify drains to be considered for diversion or treatment consisted of the following:

- Identifying impaired water bodies and impairing pollutants based on the 1998 303(d) list.
- Identifying storm drain outlets that discharge directly into an impaired water body with dry weather flows greater than or equal to 0.05 cubic feet per second (cfs), approximately 25 gallons per minute (gpm).
- A drain was considered a diversion candidate if it could be diverted to an LACSD sewer based on capacity considerations only.
- A drain was considered an alternative treatment candidate if diversion to an LACSD sewer is not possible.
- Prioritization was based on the mass loading (Flow Rate x Concentration).

2.3.1 Flow Rate Criteria

In order to identify drains that have the highest probability of adversely affecting water quality and/or the environment, only drains with a flow rate equal to or greater than 0.05 cfs were evaluated. This cutoff criteria was developed based on observations made by the County during compliance efforts associated with the Santa Monica Bay Dry Weather Bacteria TMDL. The TMDL includes a list of drains that potentially affect beach water quality and may need to be mitigated to comply with the TMDL. During site investigations, the County found that the drains on the list with dry weather flow had a peak flow rate of at least 0.05 cfs. For this reason, a minimum flow rate of 0.05 cfs was used for this study.

2.3.2 LACSD Review

LACSD received lists of drains that met the screening requirements for the Dominguez Channel, the Los Angeles River, the San Gabriel River (including Walnut Creek, San Jose Creek and Coyote Creek) and Ballona Creek. Most of the Los Angeles River drains and all of the Ballona Creek drains were outside the LACSD service area. In total, approximately 43 drains (of the total 84 identified) meeting the screening criteria were within the LACSD service area and have been evaluated by the LACSD Industrial Waste

Section for possible diversion to a sewer tributary to the Joint Water Pollution Control Plant (JWPCP). LACSD's initial evaluation was solely based on sewer capacity considerations (i.e., whether capacity was available at the closest connection location to a sewer tributary to the JWPCP). Additional information will be required in order to further consider the drains for diversion as discussed in Section 4.1 of this report. In addition, the cumulative impact of these drains to the LACSD system was not evaluated at this time.

LACSD's analyses assumed that the drain flows provided (which were based on one-time sampling events) were peak flow rates, which will have to be verified prior to diversion. To protect the LACSD sewerage system to ensure there is no threat of a sewer overflow, discharges to LACSD's collection system will only be allowed during off-peak periods. As a result, LACSD's analyses were limited to these conditions. Additional restrictions may be applicable, during the next phase of evaluation. As a result of this initial evaluation, a total of 34 drains may be further considered for diversion to an LACSD sewer. The remaining 9 drains (out of the 43) within the LACSD service area were not considered potential candidates due to lack of sewer capacity in the vicinity of the connection or because the closest sewer available was not tributary to the JWPCP. Of the 33 drains that may be acceptable, 11 drains are located within the Dominguez Channel. A total of six drains for the Los Angeles River (all the drains that were within the LACSD service area) and 17 drains within the San Gabriel River Watershed were also identified as potential diversion candidates by LACSD. As indicated earlier, only diversions tributary to the JWPCP were considered. Refer to Tables 1-3 in Appendix D for a listing of the candidate drains, approximate distance to LACSD sewer and additional comments regarding diversion of the drain.

2.3.3 City of Los Angeles Review

The City of Los Angeles (City) performed a preliminary investigation on the seven storm drain outlets that discharge into the Los Angeles River and one storm drain outlet that discharges to Ballona Creek that were identified as belonging to the City. The City verified that the eight storm drains outlets were property of the City and that the dry-weather flows could possibly be diverted to their sewer system. At the time of this investigation, based on the preliminary information (flows and locations) the primary sewers will not be impacted from the additional flow. However, a more detailed investigation will be required for these outlets before the installation of a low-flow diversion structure can be deemed fully feasible, including: water sampling and analysis, detailed analysis of sewer capacity/hydraulics, and substructure interference. The City was not able to evaluate the County drains for potential diversion to City sewers within the timeframe of this study.

2.3.4 Water Quality Prioritization

After LACSD evaluated the drains for potential diversion into their system, the drains were prioritized based on water quality impact. The pollutant load was used in order to quantify the relative impact each drain has on water quality. The pollutant load was

calculated by multiplying the flow rate by the pollutant concentration. It should be noted that although this provided a loading resulting from the discharge of these drains, it does not provide the in-stream effects of this loading. Additional study would be required to refine the priority list based on impacts to in-stream concentrations of these pollutants in the receiving waters.

3 Priority Lists

As specified in the Permit, the following lists have been prioritized according to watershed. Each watershed has a prioritized list, which identifies potential diversion candidates and alternative treatment candidates. The prioritized lists are included in Appendix B and maps for each watershed are included in Appendix C.

3.1 Malibu Creek Watershed

The Malibu Creek Watershed has eight creeks listed for impairments. Field investigations were performed for these reaches, and five storm drains in the watershed were found to have a flow rate greater than 0.05 cfs. Two of these drains discharge into Las Virgenes Creek; one discharges into Chesboro Canyon Channel; and the final two discharge into Medea Creek. These drains are prioritized in Table 1 in Appendix B based on impairing constituents. Since these drains are outside of the service area of LACSD, they are prioritized as alternative treatment candidates.

3.2 Ballona Creek Watershed

The Ballona Creek Watershed Management Area has three creeks listed for impairments. Field investigations were performed for these reaches, and flowing storm drains were found in Ballona Creek and the Santa Monica Canyon Channel. LACSD reviewed these drains, and determined that all of them are outside of their service area. Therefore, the drains are only prioritized for alternative treatment.

3.2.1 Ballona Creek

Eight storm drains discharging into Ballona Creek met the flow criteria of this study. For this study, the County analyzed dry-weather water quality samples for all impairing constituents from these drains. The eight drains are prioritized in Table 2 in Appendix B based on impairing constituents. Since these drains are outside of the service area of LACSD, all these drains are considered alternative treatment candidates except for the one drain owned by the City of Los Angeles, which can possibly be diverted to their system.

3.2.2 Santa Monica Canyon Channel

Two storm drains discharging into the Santa Monica Canyon Channel met the flow criteria of the study. For this study, the County collected dry-weather water quality

samples for all impairing constituents from these drains. The two drains are prioritized in Table 3 in Appendix B based on impairing constituents. The City of Los Angeles is currently in the process of completing a diversion for the entire Santa Monica Canyon Channel. For this reason, these two individual drains should not be diverted to the sewer system unless they are found to have a profound impact on in-stream water quality and source identification is unsuccessful.

3.2.3 Santa Monica Bay Shoreline

The Santa Monica Bay shoreline has been studied previously by both the City of Los Angeles and LACSD. The study performed by the City of Los Angeles was used as a basis for the Santa Monica Bay Dry Weather Bacteria TMDL. This TMDL listed 27 storm drains (see Table 4 in Appendix B) that discharge to the Bay as a significant cause of elevated bacteria levels at the beach. The County and various cities are currently working to construct diversions at these locations, if necessary, in order to fulfill the requirements of the TMDL. These drains should be considered a higher priority than the other drains identified in this study due to their direct impact on public health and/or the environment.

For a Supplemental Environmental Project (SEP), LACSD surveyed 172 storm drains in the coastal area from Manhattan Beach to Long Beach. LACSD concluded that only two drains in this area were confirmed as sources that have a high probability to cause or contribute to exceedances in receiving water objectives. These drains were two of the 27 listed in the TMDL. A diversion was already built at one of these locations in 2001, and it is currently being upgraded to meet the requirements of the TMDL. The County has received grant funding to divert the other drain, and construction of the diversion is expected to be complete by October, 2003.

3.3 Dominguez Watershed

Eighteen drains discharging into the Dominguez Channel were identified by the Regional Board with flow greater than 0.05 cfs. The Regional Board collected flow and water quality data in June, 2002, for the development of a Dominguez Channel Bacteria TMDL. The storm drains in this area were within the service area of LACSD. LACSD analyzed these eighteen drains, and determined that twelve were possible diversion candidates. These drains are prioritized in Table 5 in Appendix B.

3.4 San Gabriel River Watershed

The San Gabriel River Watershed has four reaches listed for impairments to beneficial uses. Twenty drains discharging into these water bodies were quantified with a flow rate equal to or greater than 0.05 cfs. The Southern California Coastal Water Research Project (SCCWRP), with the cooperation of various stakeholders, organized a sampling effort, which included the collection of flow and water quality data, in September, 2002 for the development of a deterministic model for the San Gabriel River and its tributaries. The storm drains in this area were within the LACSD service area. LACSD analyzed the

flow rates from these twenty drains, and determined that seventeen were possible diversion candidates. These drains are prioritized in Table 6 in Appendix B.

3.5 Los Angeles River Watershed

The Los Angeles River Watershed has a total of ten water bodies listed for impairments to beneficial uses. The Southern California Coastal Water Research Project (SCCWRP) with the cooperation of various stakeholders organized a sampling effort, which included the collection of flow and water quality data, in July 2000 and August 2001 for the development of a deterministic model for the Los Angeles River and its tributaries. From this data, thirty-two drains discharging into the Los Angeles River and tributaries were quantified with a flow rate equal to or greater than 0.05 cfs. Of these thirty-two drains, only six were located within the LACSD service area. After LACSD evaluation, all six are possible diversion candidates. Six additional drains owned and maintained by the City of Los Angeles are possible diversion candidates to the City's primary sewer system. The remaining twenty drains, owned by the County, are prioritized as alternative treatment candidates. These drains are prioritized in Table 7 in Appendix B.

3.6 Santa Clara River Watershed

The Santa Clara River Watershed has two water bodies listed for impairments to beneficial uses, which includes one reach of Mint Canyon Creek and three reaches of the Santa Clara River. There were no drains that met the minimum flow requirement of 0.05 cfs. Therefore, there are no drains listed in this report for the watershed.

4 Additional Considerations

Although the methodology developed for this study successfully identified storm drains as possible diversion candidates, the scope of the study did not include the long-term investigations and analyses that will be necessary before the feasibility of the dry weather diversions can be fully assessed. Further, every effort was taken to ensure this study was comprehensive and complete; however, dry weather urban runoff characteristics are inherently variable. For this reason, if a drain not listed in this report is suspected to be a significant source of pollution, the methodology developed for this study can be used to evaluate the relative impact of the discharge. The following section outlines some of the steps that need to be completed prior to the construction of a diversion.

4.1 LACSD Criteria for Diversion Candidates

Additional information is required by LACSD in order to further assess the 35 drains identified in this study. LACSD evaluation of refined flow estimates, flow sources, drain alignment and water quality data will be necessary for each proposed drain diversion. LACSD also requires that drains be ranked in order of priority and that an analysis to identify and reduce flows at the source be completed for each diversion candidate. Diversions will not be allowed where incompatible pollutants have been detected in

quantities that may interfere with the treatment plant's ability to comply with waste discharge requirements. At this time, only diversions to sewers tributary to the JWPCP are being considered and compliance with the corresponding NPDES permit and Ocean Plan criteria will be evaluated as part of the analyses.

4.2 Alternatives to Sanitary Sewer Diversions

The diversion of dry weather urban runoff to the sanitary sewer is just one of many BMPs that can effectively control the impact of urban runoff on receiving water bodies and the environment. Although many locations were identified in this study as a potential low flow diversion site, this study did not investigate the impact of the urban runoff on the receiving water body or the environment. Further, the diversion of dry weather urban runoff and other end-of-pipe treatment BMPs should be implemented only as a last choice after pollutant source identification and source control BMPs fail to find and/or reduce the impacts of the urban runoff.

4.3 Technical Feasibility and Cost/Benefit Analysis

Investigating the technical feasibility and performing cost/benefit analyses for the drains listed as possible diversion candidates in this report were outside of the scope of this study. However, these procedures are necessary next steps in order to determine the appropriate mitigation measures. For example, many of the diversion candidates in the San Gabriel River Watershed are a substantial distance (up to 11,000 feet) from the nearest sewer capable of accepting the dry weather urban runoff. In these cases, constructing a discharge line from the storm drain outlet to the sewer line could easily triple the cost of a diversion making other mitigation measures much more cost effective.

5 Study Conclusions

We have prioritized the drains within the Los Angeles Basin that discharge into water bodies with historical exceedances of water quality objectives. These drains are potential candidates for dry weather diversion and alternative treatment. However, the design, construction and maintenance of dry weather diversions require significant financial resources. Complete characterization of the flow regime within each drain must be performed prior to proceeding with any plans to construct the diversions since the drains identified in this study were prioritized according to pollutant loading calculated from a single flow and water quality assessment.

Appendix A

Table 1

Table of Water Quality Impairments

	Abnormal Fish Histology	Aldrin	Ammonia	Arochlor	Arsenic	Cadmium	ChemA	Chlordane	Chloride	Chlorpyrifos	Chromium	Copper	DDT	Dichloroethylene/1,1-DCE	Dieldrin	Enteric Viruses	Fish Barriers	High Coliform Count	Lead	Mercury	Nitrate/Nitrite	Nutrients (Algae)	Odors	Oil	Org. Enrichment/Low D.O.	PAHs	PCBs	pH	Scum/Foam-unnatural	Sediment Toxicity	Selenium	Shellfish Harvesing Adv.	Silver	Tetrachloroethylene/PCE	Toxicity	Trash	Tributylin	Trichloroethylene/TCE	Zinc
Ballona Creek WMA																																						
Ballona Creek					X	X	X	X				X	X		X	X		X	X								X			X			X		X	X	X		
Ballona Creek Estuary				X				X					X					X	X							X	X			X		X						X
Santa Monica Canyon																		X	X																				
Sepulveda Canyon			X															X	X																				
Dominguez Channel WMA																																						
Dominguez Channel		X	X				X	X			X	X	X		X			X	X							X	X							X				X
Dominguez Channel Estuary		X	X				X	X			X	X	X		X			X	X							X	X							X				X
Torrance Carson Channel												X						X	X																				
Los Angeles River WMA																																						
Aliso Canyon Wash																														X								
Arroyo Seco																		X				X													X			
Bell Creek																		X																				
Burbank Western Channel			X			X																X	X					X							X			
Compton Creek												X						X	X								X											
Los Angeles River Reach 1			X															X	X			X					X	X							X			
Los Angeles River Reach 2			X															X	X			X	X	X				X							X			
Los Angeles River Reach 3			X																			X	X					X							X			
Los Angeles River Reach 4			X															X	X			X	X					X							X			
Los Angeles River Reach 5			X				X			X												X	X	X				X							X			
Los Angeles River Reach 6													X					X														X				X		
Monrovia Canyon Creek																			X																			
Rio Hondo Reach 1			X									X						X	X								X								X			X
Rio Hondo Reach 2																		X																				
Tujunga Wash			X									X						X					X					X										
Verdugo Wash																		X				X													X			
Malibu Creek WMA																																						
Las Virgenes Creek																		X				X			X			X		X					X			
Lindero Creek																		X				X						X		X					X			
Malibu Creek																X		X				X						X							X			
Medea Creek																		X				X								X					X			
Cheeseboro Canyon Channel																		X																				
Stokes Creek																		X																				
Topanga Canyon Creek																			X																			

	Abnormal Fish Histology	Aldrin	Ammonia	Arochlor	Arsenic	Cadmium	ChemA	Chlordane	Chloride	Chlorpyrifos	Chromium	Copper	DDT	Dichloroethylene/1,1-DCE	Dieldrin	Enteric Viruses	Fish Barriers	High Coliform Count	Lead	Mercury	Nitrate/Nitrite	Nutrients (Algae)	Odors	Oil	Org. Enrichment/Low D.O.	PAHs	PCBs	pH	Scum/Foam-unnatural	Sediment Toxicity	Selenium	Shellfish Harvesing Adv.	Silver	Tetrachloroethylene/PCE	Toxicity	Trash	Tributylin	Trichloroethylene/TCE	Zinc
Malibu Creek WMA																																							
Triunfo Canyon Creek																		X	X																				
San Gabriel River WMA																																						
Coyote Creek	X		X														X				X										X							
San Gabriel River East Fork																																	X					
San Gabriel River Estuary	X				X																																	
San Gabriel River Reach 1	X		X														X				X												X					
San Gabriel River Reach 2			X														X	X																				
San Gabriel River Reach 3																																	X					
San Jose Creek			X														X				X																	
Walnut Creek Wash																										X							X					
Santa Clarita WMA																																						
Mint Canyon Creek																				X																		
Santa Clara River Reach 7			X					X									X			X																		
Santa Clara River Reach 8			X					X									X			X				X														
Santa Clara River Reach 9																	X																					

Table 2		
Existing Data Sources		
Drainage Area	**Lead Entity**	**Purpose for Data Collection**
Los Angeles River Watershed	Southern California Coastal Water Research Project	Deterministic Model Development
San Gabriel River Watershed	Southern California Coastal Water Research Project	Deterministic Model Development
Dominguez Channel Watershed	Regional Water Quality Control Board	TMDL Development
North Santa Monica Bay	City of Los Angeles	Low-Flow Diversion Master Plan Report
South Santa Monica Bay	County Sanitation Districts of Los Angeles County	Supplemental Environmental Report

Appendix B

	Table 1							
	Malibu Creek Watershed Prioritized List[1]							
	Map ID	**Drain Ownership**	**Tributary Area[2]**	**Drain ID**	**Chem ID**	**Flow Rate[3]**	**Potential Candidate Diversion to:**	**Alternative Treatment Candidate Only**
1	Malibu-1	County	County-90% Calabasas-10%	PD 1522	Malibu-1	20		YES
2	Malibu-5	County	Agoura Hills	Driver Drain	Malibu-5	30		YES
3	Malibu-3	County	Agoura Hills	PD 1005	Malibu-3	25		YES
4	Malibu-4	County	Agoura Hills	PD1025	Malibu-4	35		YES
5	Malibu-2	County	County-85% Calabasas-15%	PD 2081	Malibu-2	25		YES

Notes:

1) Prioritized 1 through 5, with 1 being the highest priority. Prioritization based on pollutant loadings calculated from water quality results collected during field investigations.

2) Tributary Area is estimated based on storm drain alignment

3) Flow Rates were determined during field investigations.

	Table 2						
	Ballona Creek Watershed Prioritized List[1]						
	Map ID	**Drain Ownership**	**Tributary Area[2]**	**Drain ID**	**Flow Rate[3]**	**Potential Candidate Diversion to:**	**Alternative Treatment Candidate Only**
1	BC-03	County	Los Angeles	DDI 1-11	300		YES
2	BC-02	County	Los Angeles	PD9408	450		YES
3	BC-01	County	Los Angeles	PD54	1200		YES
4	BC-05	County	Los Angeles	PD84	150		YES
5	BC-07	County	Los Angeles-75% Culver City-25%	Benedict Canyon Channel	120		YES
6	BC-04	County	Los Angeles-90% Culver City-10%	DDI 1-3	35		YES
7	BC-06	City of Los Angeles	Los Angeles	City	35	City of LA	
8	BC-08	County	Los Angeles	Sepulveda Channel	35		YES

Notes:
1) Prioritized 1 through 8, with 1 being the highest priority. Prioritization based on pollutant loadings calculated from water quality results collected during field investigations.

2) Tributary Area is estimated based on storm drain alignment

3) Flow Rates were determined during field investigations.

	Table 3						
	Santa Monica Canyon Channel Prioritized List[1]						
	Map ID	**Drain Ownership**	**Tributary Area[2]**	**Drain ID**	**Flow Rate[3]**	**Potential Candidate Diversion to:**	**Alternative Treatment Candidate Only**
1	SMC-02	County	Santa Monica	Project 206	30		YES
2	SMC-01	County	City of LA	Project 702	25		YES

Notes:

1) Prioritized 1 through 2, with 1 being the highest priority. Prioritization based on pollutant loadings calculated from water quality results collected during field investigations. The City of LA is currently designing a diversion for the entire channel.

2) Tributary Area is estimated based on storm drain alignment

3) Flow Rates were determined during field investigations.

Table 4

Santa Monica Bay Dry-Weather Bacteria TMDL

List of 27 Major Storm Drains Identified by the TMDL[1]

	Major Storm Drains to SMB	Drain Ownership	Drain ID	TG Page /Grid No.	Runoff Contribution
1	Castlerock & Parker Canyon	County	Parker Mesa Dr.	630, E6	County/L.A./State Park
2	Santa Ynez (Sunset Blvd.)	County	Proj. No. 674	630, G6	L.A./State Park
3	Bay Club Drive	City of LA			L.A.
4	Marquez Avenue	City of LA			L.A.
5	Pulga	County	Proj. No. 501	630, J6	L.A./State Park
6	Temescal	County	Proj. No. 500	630, J6	L.A.
7	Palisades Park	City of LA			L.A.
8	Santa Monica Canyon	County	Santa Monica Canyon Channel	631, E4	L.A./Santa Monica
9	Montana Avenue	County	Proj. No. 248	671, D1	Santa Monica
10	Wilshire Boulevard	County	Proj. No. 577	671, D2	Santa Monica
11	Santa Monica Pier	County	Proj. No 249	631, E3	Santa Monica
12	Pico-Kenter	County	Proj. No. 249	631, E3	L.A./Santa Monica
13	Ashland Ave. & Rose Ave.	County	Proj. No. 46	631, F5	L.A./Santa Monica
14	Thornton Avenue	City of LA			L.A./Santa Monica
15	Brooks Avenue	County	Proj. No. 507	631, G6	L.A.
16	Windward Ave./Venice Pavillion	County	Proj. No. 507	631, G6	L.A.
17	Playa del Rey/Culver Blvd.	County	Proj. No. 513	702, A3	L.A.
18	North Westchester	County	Proj. No. 5241	702, B5	L.A./El Segundo
19	Imperial Highway	County	Proj. No. 513, 291	702, C-E6	L.A./El Segundo
20	El Segundo Blvd./Grand Ave.	County	Proj. No. 3402	732, D-F2	L.A./El Segundo
21	South of Dockweiler Jetty	County	Proj. No. 9850	732, D-F4	Mahattan Beach
22	27th St., Manhattan Beach	County	Proj. No. 286 (28th S	732, E-F4	Manhattan Beach
23	Manhattan Beach Pier	Manhattan Beach			
24	Hermosa Beach Pier	County	Pier Ave. Dr.	762, G2	Hermosa Beach
25	Herondo Street	County	Proj. No. 1105	762, H3	Hermosa Beach/Redondo Beach/Torrance
26	Redondo Beach Pier	County	Proj. No. 569	762, H5	Hermosa Beach/ Redondo Beach
27	Avenue I/Miramar	County	Proj. No. 569	792, J1	Redondo Beach/ Torrance

Notes:

1) This list is not prioritized. All of these drains will need to be mitigated if they discharge to the Bay during dry weather

	Table 5						
	Dominguez Channel Watershed Prioritized List[1]						
	Map ID	**Drain Ownership**	**Tributary Area[2]**	**Drain ID**	**Flow Rate[3]**	**Potential Candidate Diversion[4] to:**	**Alternative Treatment Candidate Only[5]**
1	DC-37	County	Carson	PD547	1427	LACSD	
2	DC-08	County	Gardena	MTD 783	144	LACSD	
3	DC-29	County	City of LA-50% County 50%	Project 3894	5994		YES
4	DC-24	County	Lawndale-70% County-30%	Project 12	923	LACSD	
5	DC-32	County	Carson	Project 1232	3132		YES
6	DC-51	County	City of LA-50% Hawthorne-50%	Dominguez Channel	27	LACSD	
7	DC-10	County	Gardena-70% Torrance-30%	Project 3501	81	LACSD	
8	DC-33	County	County-75% Carson-25%	Project 1153	167	LACSD	
9	DC-22	County	County-50% Lawndale-50%	Alondra Park Drain	23	LACSD	
10	DC-30	County	Carson	PD212	743		YES
11	DC-42	County	Hawthorne	139th St Drain	302		YES
12	DC-50	County	Inglewood	PD4401	149	LACSD	
13	DC-31	County	Carson	PD1131	284	LACSD	
14	DC-48	County	Hawthorne	MTD687	1197		YES
15	DC-49	County	Hawthorne	MTD687	1544		YES
16	DC-07	County	Torrance-60% City of LA-30% Gardena-10%	Westgard Drain	36	LACSD	
17	DC-05	County	Gardena	Project 10	41	LACSD	

Notes:

1) Prioritized 1 through 17, with 1 being the highest priority. Prioritization based on pollutant loadings calculated from water quality results collected during field investigations for this study.

2) Tributary Area is estimated based on storm drain alignment

3) Flow Rates were provided by the Regional Board.

4) See Appendix D for further details provided by LACSD

5) Alternative Treatment Candidates were prioritized based solely on the water quality results provided by the Regional Board.

	Table 6						
	San Gabriel River Watershed Prioritized List[1]						
	Map ID	**Drain Ownership**	**Tributary Area[2]**	**Drain ID**	**Flow Rate[3]**	**Potential Candidate Diversion[4] to:**	**Alternative Treatment Candidate Only**
					gpm		
1	SGR-12	County	County	Project 442	80	LACSD	
2	SGR-04	County	Pomona	MTD 184	20	LACSD	
3	SGR-05	County	Pomona	Project 266	35	LACSD	
4	SGR-10	County	County	MTD 76	100	LACSD	
5	SGR-18	County	West Covina	MTD 22	35	LACSD	
6	SGR-03	County	Cerritos-40% Artesia-60%	Projects 21 and 143	50		YES
7	SGR-08	County	Walnut- 90% County -10%	Project 8301	40	LACSD	
8	SGR-20	County	Cerritos	Project 1113	30	LACSD	
9	SGR-07	County	County	MTD 1377	65	LACSD	
10	SGR-11	County	County	MTD 8	100	LACSD	
11	SGR-17	County	West Covina	Project 8402	35	LACSD	
12	SGR-16	County	West Covina	MTD 180	35	LACSD	
13	SGR-19	County	West Covina	Project 589	25	LACSD	
14	SGR-13	County	County	RDD 280	35	LACSD	
15	SGR-15	County	Covina-75% West Covina-25%	Charter Oak Wash	40	LACSD	
16	SGR-09	County	County	PD 1381	40	LACSD	
17	SGR-21	County	Downey	Project 9005	30		YES
18	SGR-14	County	County	MTD 587	35	LACSD	
19	SGR-06	County	Pomona	MTD 644	35	LACSD	
20	SGR-02	County	Cerritos-25% Lakewood-25% Hawaiin Gardens-25% Long Beach-25%	Project 21	40		YES

Notes:

1) Prioritized 1 through 20, with 1 being the highest priority. Prioritization based on pollutant loadings calculated from water quality results provided by SCCWRP.

2) Tributary Area is estimated based on storm drain alignment

3) Flow Rates were determined during field investigations.

4) See Appendix D for further details provided by LACSD

Table 7

Los Angeles River Watershed Prioritized List[1]

	Map ID	Drain Ownership	Tributary Area[2]	Drain ID	Flow Rate[3]	Potential Candidate Diversion[4] to:	Alternative Treatment Candidate Only
					gpm		
1	LAR-5	County	City of LA	Calabasas Creek	3596		YES
2	LAR-2	County	City of LA	Bell Creek	655		YES
3	LAR-15	County	City of LA	Project 67	563		YES
4	LAR-6	County	City of LA	Aliso Creek	1164		YES
5	LAR-16	County	City of LA	Project 14	2537		YES
6	LAR-21	County	Hidden Hills-50% City of LA-25% County-25%	Project 4101	2098		YES
7	LAR-23	County	City of LA	City	150		YES
8	LAR-20	County	City of LA-50% Calabasas-50%	Dry Canyon Creek	1731		YES
9	LAR-3	County	City of LA	Dayton Creek	732		YES
10	LAR-18	County	Downey	Project 19	748	LACSD	
11	LAR-9	County	City of LA	Project 469	73		YES
12	LAR-1	County	City of LA	Project 5202	323		YES
13	LAR-13	County	City of LA	Project 60140	198		YES
14	LAR-14	County	City of LA	Arroyo Seco	2078		YES
15	LAR-32	City of Los Angeles	City of LA	City	22	City of LA	
16	LAR-17	County	County-75% Vernon-25%	Project 5550	288	LACSD	
17	LAR-22	County	Vernon-80% County-20%	DDI -28	168	LACSD	
18	LAR-27	City of Los Angeles	City of LA	City	258	City of LA	
19	LAR-29	County	Maywood-50% Bell-50%	Project 9903	321	LACSD	
20	LAR-11	County	City of LA	Project 464	79		YES
21	LAR-31	City of Los Angeles	City of LA	City	22	City of LA	
22	LAR-28	City of Los Angeles	City of LA	City	141	City of LA	
23	LAR-7	County	City of LA	Project 96	40		YES
24	LAR-8	County	City of LA	Project 474	56		YES
25	LAR-19	County	County-33% Norwalk-33% City of LA-33%	Compton Creek	44	LACSD	
26	LAR-12	County	City of LA	Project 39	65		YES
27	LAR-30	County	Long Beach	Dominguez Gap	40	LACSD	
28	LAR-10	County	City of LA	Project 36	37		YES
29	LAR-4	County	City of LA	Browns Creek	47		YES
30	LAR-25	City of Los Angeles	City of LA	City	79	City of LA	
31	LAR-24	City of Los Angeles	City of LA	City	26	City of LA	
32	LAR-26	City of Los Angeles	City of LA	City	33	City of LA	

Notes:

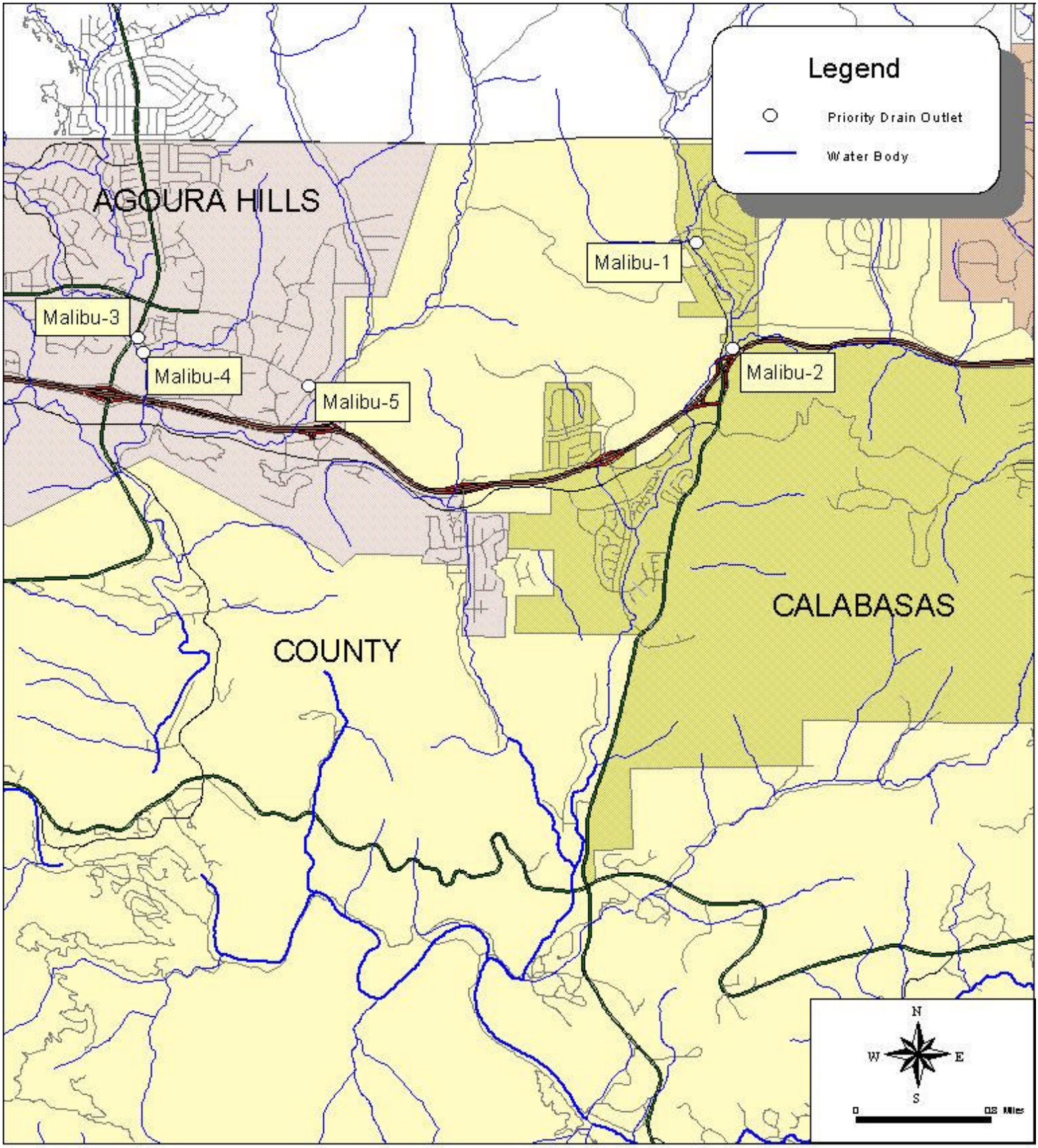
1) Prioritized 1 through 32, with 1 being the highest priority. Prioritization based on pollutant loadings calculated from water quality results provided by SCCWRP.

2) Tributary Area is estimated based on storm drain alignment

3) Flow Rates were provided by SCCWRP.

4) See Appendix D for further details provided by LACSD

Appendix C



PUBLIC WORKS

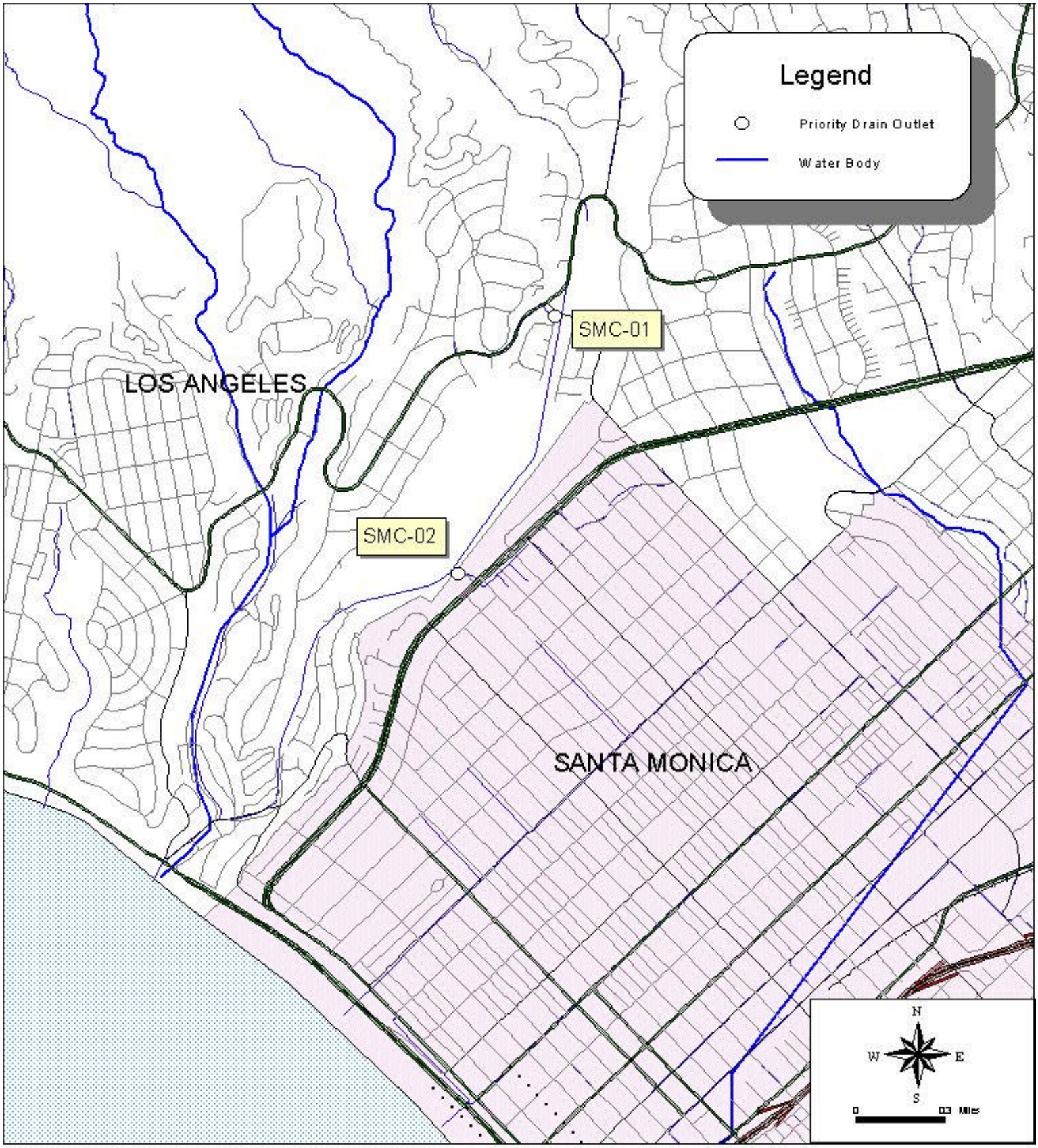
Treatment Feasibiliy Study
Malibu Creek Watershed
Priority Drains

LOS ANGELES COUNTY
WATERSHED MANAGEMENT

PUBLIC WORKS

Treatment Feasibiliy Study
Ballona Creek Watershed
Priority Drains

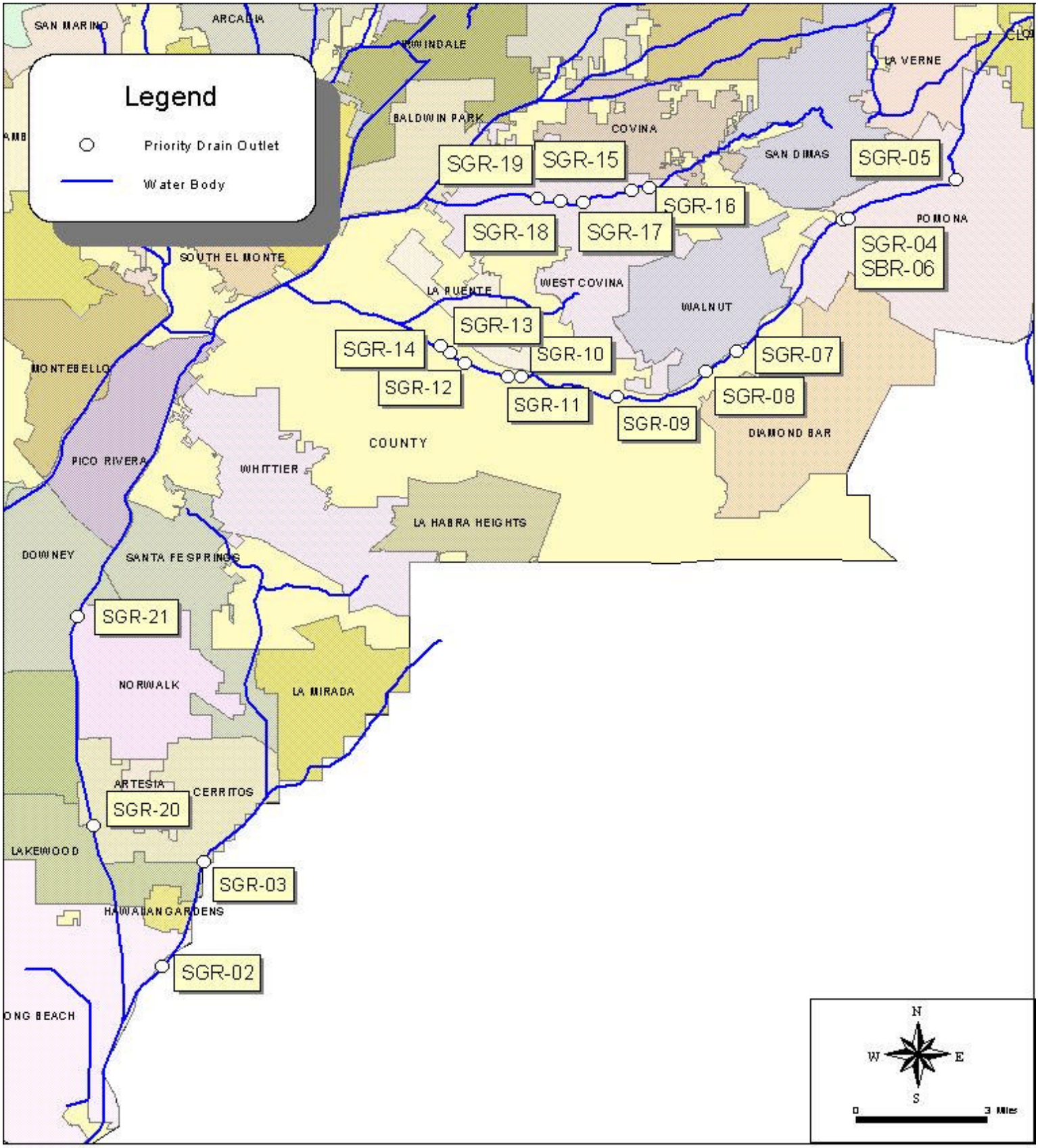
LOS ANGELES COUNTY WATERSHED MANAGEMENT



PUBLIC WORKS

Treatment Feasibiliy Study
Santa Monica Canyon Channel
Priority Drains

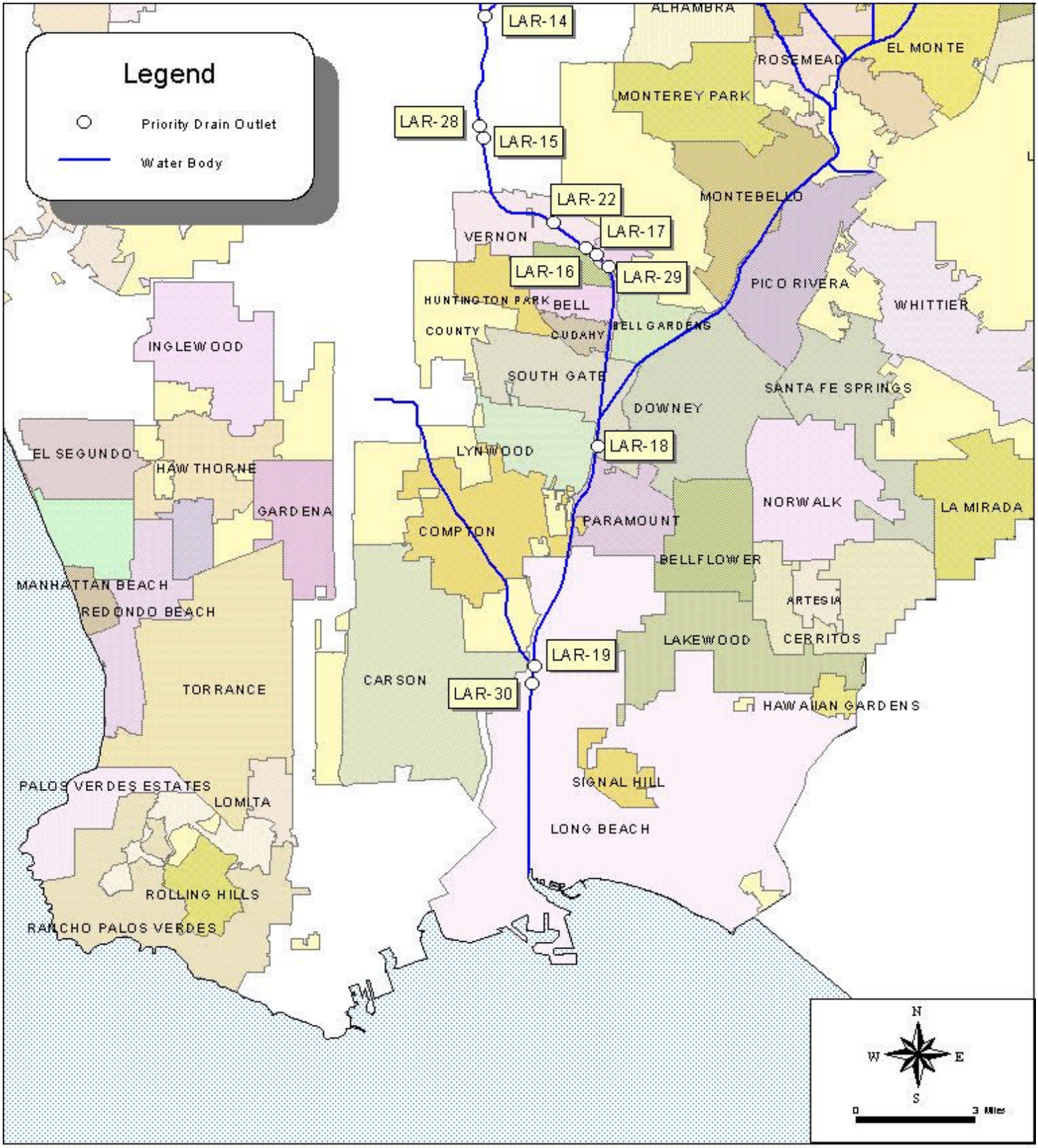
LOS ANGELES COUNTY WATERSHED MANAGEMENT



Treatment Feasibiliy Study
San Gabriel River Watershed
Priority Drains

PUBLIC WORKS

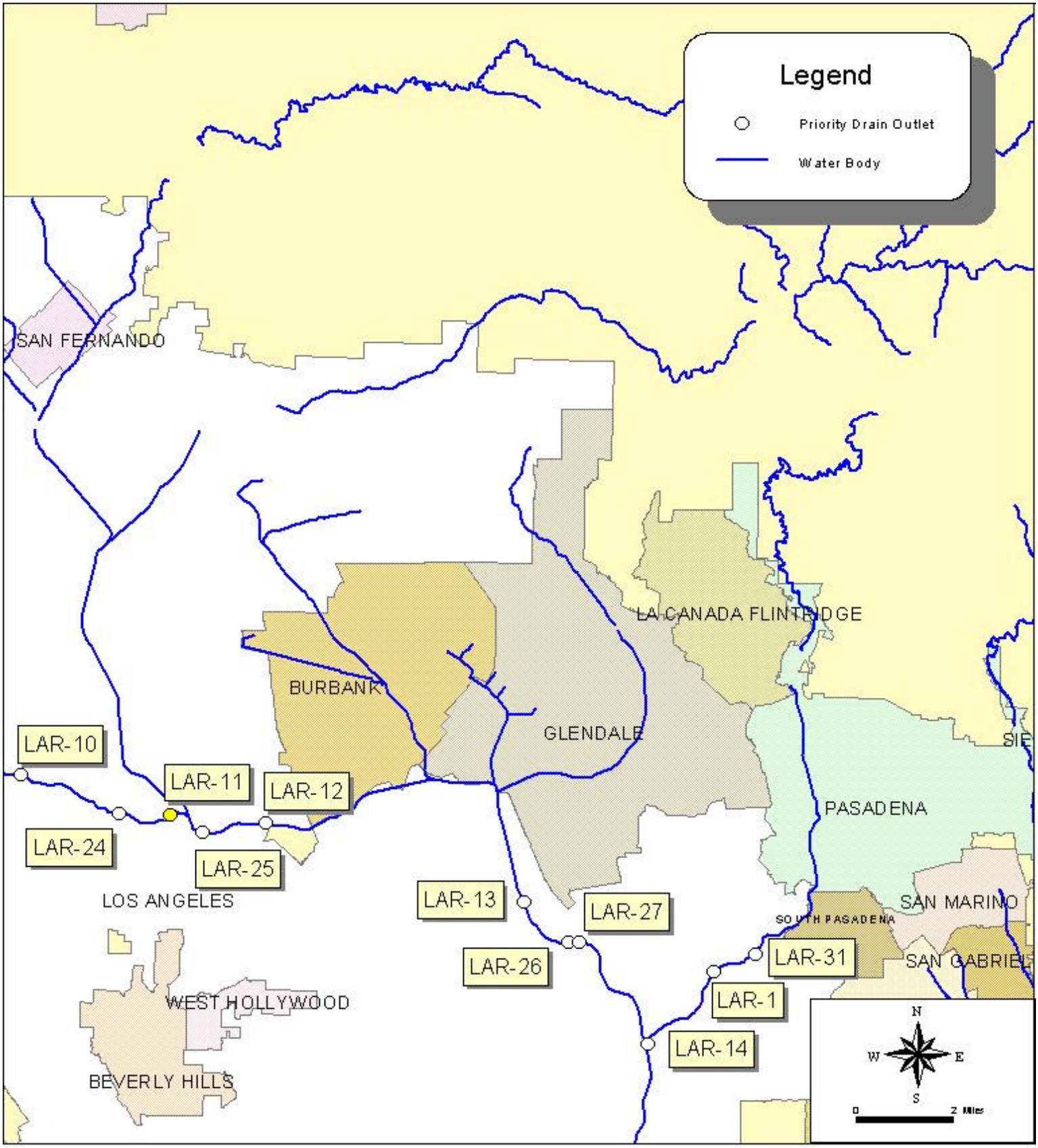
LOS ANGELES COUNTY
WATERSHED MANAGEMENT



Treatment Feasibiliy Study
Los Angeles River Watershed
Reach 1 of 3
Priority Drains

PUBLIC WORKS

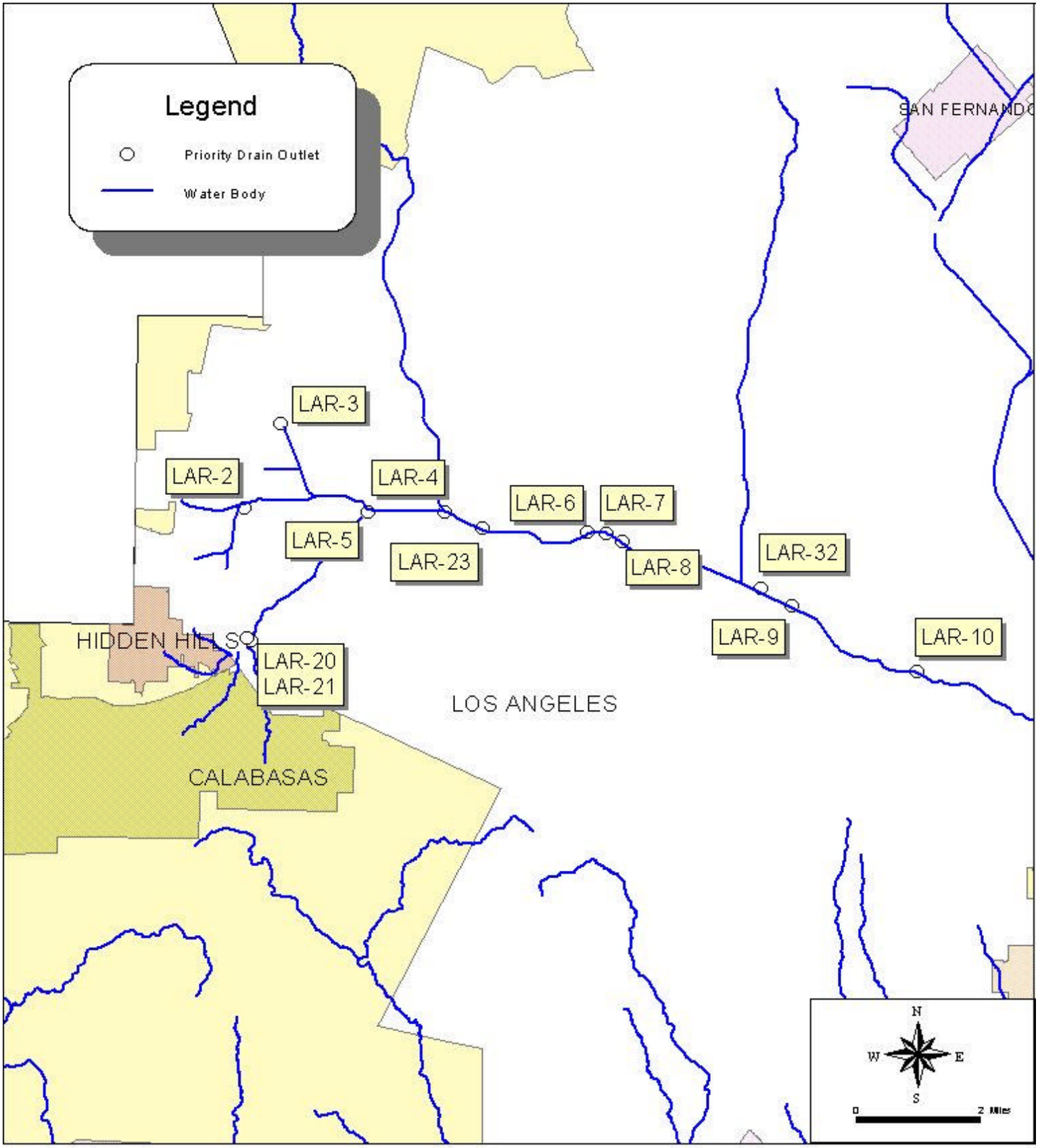
LOS ANGELES COUNTY WATERSHED MANAGEMENT



Treatment Feasibiliy Study
Los Angeles River Watershed
Reach 2 of 3
Priority Drains

PUBLIC WORKS

LOS ANGELES COUNTY WATERSHED MANAGEMENT



PUBLIC WORKS

Treatment Feasibiliy Study
Los Angeles River Watershed
Reach 3 of 3
Priority Drains

LOS ANGELES COUNTY WATERSHED MANAGEMENT

Appendix D

Table 1

Los Angeles River Diversion Candidates

Station	Waterbody	Station Qpeak		Nearest Sewer(s)	Distance to Districts' sewer	Comments
		gpm	cfs		ft	
LAR-22	Los Angele River	168	0.37	JOH-2G/JOH-2F	550/ 570	A couple of possible sewer connections are available at this location.
LAR-17	Los Angele River	288	0.64	JOH-2G	2,590	Diversion to the JOH-2G sewer will have to cross or siphon across the LA River.
				Wright Road	2,700	A diversion station will have to be built on the south side of the channel for diversion to the Wright Road sewer.
				JOA-9	4,640	Diversion to the JOA-9 sewer will have to cross the LA River and transition more than 4,600 ft.
LAR-29	Los Angele River	321	0.72	JOA-9/ JOH-2D	2840/ 4,490	A couple of possible sewer connections are available at this location, however both connection distances are significant.
LAR-18	Los Angele River	748	1.67	JOH-1B/ JOA-9	225/ 2,420	A couple of sewer connections available.
LAR-19	Los Angele River	44	0.10	North Long Beach Trunk Sewer	790	A diversion station (for diversion into the North Long Beach Trunk sewer) may have to be built on the east side of the channel.
				Davidson City Trunk Sewer, Sect. 1, 2 & 3	4,950	Diversion to the Davidson City trunk sewer would have to cross the LA River, Long Beach Freeway, several railroads and transition more than 4,900 ft.
LAR-30	Los Angele River	40	0.09	North Long Beach Trunk Sewer	720	The diversion to the North Long Beach trunk sewer could be sent across the Metro Blue Line bridge crossing the LA River to the east side of the channel to the North Long Beach Trunk Sewer.
				Davidson City Trunk Sewer, Sect. 1, 2 & 3	5,910	

Table 2						
San Gabriel River Diversion Candidates						
Station	Waterbody	Station Qpeak		Nearest Sewer	Distance to Districts' sewer	Comments
		gpm	cfs		ft	
SGR-04	San Gabriel River/ San Jose Creek	20	0.04	JOA-1A Dist. 21 Int.	3,500	Substantial distance to nearest acceptable Districts' trunk sewer.
SGR-05	San Gabriel River/ San Jose Creek	35	0.08	JOA_1A - Etiwanda-Edison WW Line	490	Etiwanda-Edison WW Line sewer is currently out-of-service. Inspection and repair would be required prior to placing in service.
SGR-06	San Gabriel River/ San Jose Creek	35	0.08	JOA-1A Dist. 21 Int.	3,850	Substantial distance to nearest acceptable Districts' trunk sewer.
SGR-07	San Gabriel River/ San Jose Creek	65	0.14	JOA-1A Dist. 21 Int.	4,560	Substantial distance to nearest acceptable Districts' trunk sewer.
SGR-08	San Gabriel River/ San Jose Creek	40	0.09	JOA-1A Dist. 21 Int.	2,580	Substantial distance to nearest acceptable Districts' trunk sewer.
SGR-09	San Gabriel River/ San Jose Creek	40	0.09	JOA-1A Dist. 21 Int.	3,360	Substantial distance to nearest acceptable Districts' trunk sewer.
SGR-10	San Gabriel River/ San Jose Creek	100	0.22	JOA-1A Dist. 21 Int.	2,960	Substantial distance to nearest acceptable Districts' trunk sewer.
SGR-11	San Gabriel River/ San Jose Creek	100	0.22	JOA-1A Dist. 21 Int.	2,030	Substantial distance to nearest acceptable Districts' trunk sewer.
SGR-12	San Gabriel River/ San Jose Creek	80	0.18	JOA-1A Dist. 21 Int.	40	
SGR-13	San Gabriel River/ San Jose Creek	35	0.08	JOA-1A Dist. 21 Int.	500	
SGR-14	San Gabriel River/ San Jose Creek	35	0.08	JOA-1A Dist. 21 Int.	2,690	Substantial distance to nearest acceptable Districts' trunk sewer.
SGR-15	San Gabriel River/ Walnut	40	0.09	JOH-9C	10,585	Substantial distance to nearest acceptable Districts' trunk sewer.
SGR-16	San Gabriel River/ Walnut	35	0.08	JOH-9C	9,400	Substantial distance to nearest acceptable Districts' trunk sewer.
SGR-17	San Gabriel River/ Walnut	35	0.08	JOH-9C	11,150	Substantial distance to nearest acceptable Districts' trunk sewer.
SGR-18	San Gabriel River/ Walnut	35	0.08	JOH-9C	6,110	Substantial distance to nearest acceptable Districts' trunk sewer.
SGR-19	San Gabriel River/ Walnut	25	0.06	JOH-9C	5,800	Substantial distance to nearest acceptable Districts' trunk sewer.
SGR-20	San Gabriel River	30	0.07	Artesia Extension Tr.	5,510	Substantial distance to nearest acceptable Districts' trunk sewer. Also may need to cross a flood control channel.

Table 3						
Dominguez Channel Diversion Candidates						
Station	Waterbody	Station Qpeak		Nearest Sewer	Distance to Districts' sewer	Comments
		gpm	cfs		ft	
DC-51	Dominguez Channel	27	0.06	S.I.O.Ave	2,050	Substantial distance to nearest acceptable Districts' trunk sewer.
DC-50	Dominguez Channel	148	0.33	S.I.O.Ave	1,500	Substantial distance to nearest acceptable Districts' trunk sewer.
DC-24	Dominguez Channel	911	2.05	D 5 Main/ JOD-5	50 /305	Discharge not recommended to the D5 Main Trunk Sewer if combined with discharge from adjacent diversion stations. Discharge to JOD-5 could be acceptable with adjacent stations' low flow discharges.
DC-22	Dominguez Channel	22	0.05	D 5 Main/ JOD-5	40/ 10	Discharge not recommended to the D5 Main T.S. if combined with discharge from adjacent diversion stations. Discharge to JOD-5 could be acceptable with adjacent stations' low flow discharges.
DC-10	Dominguez Channel	81	0.18	Gramercy Place Sec 1	50	
DC-08	Dominguez Channel	144	0.32	JOD-2B	150	
DC-07	Dominguez Channel	36	0.08	JOD-2B	75	
DC-05	Dominguez Channel	40	0.09	Gardena Pump Trunk	600	
DC-31	Dominguez Channel	283	0.63	Del Amo Trunk	400	
DC-33	Dominguez Channel	166	0.37	Main St Trunk	60	
DC-37	Dominguez Channel	1423	3.17	JOB-9B	370	Must discharge to JOB downstream of the pressurized (surcharged) siphon. The connection must be pumped and backflow prevented in case of surcharging conditions. Manhole B17 is the point where surcharging no longer occurs. Connection should be made down